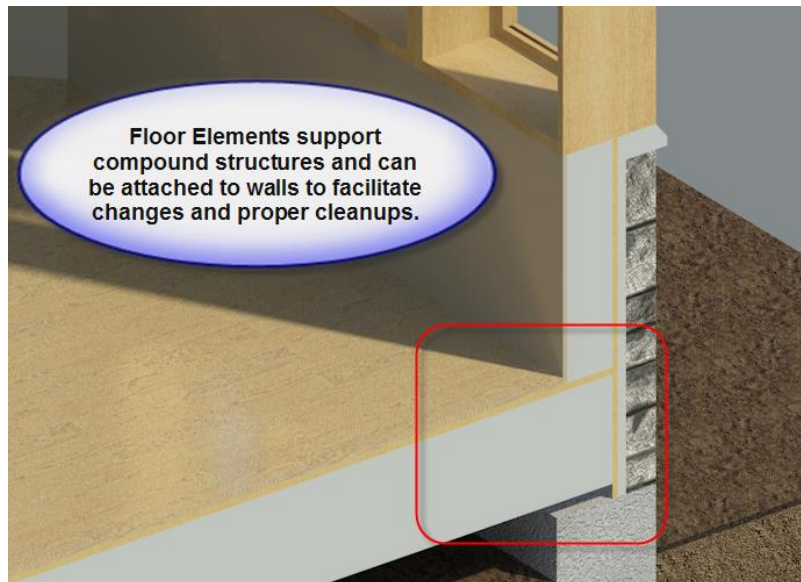


AGENDA:

1. Floors
2. Floor Slab Edges
3. Foundations

1. Floors

Revit allows you to define floors by sketching their perimeters. You can use the line tools to draw the perimeter with lines and arcs, or you can use the Pick Walls tool to create the boundary from existing walls.

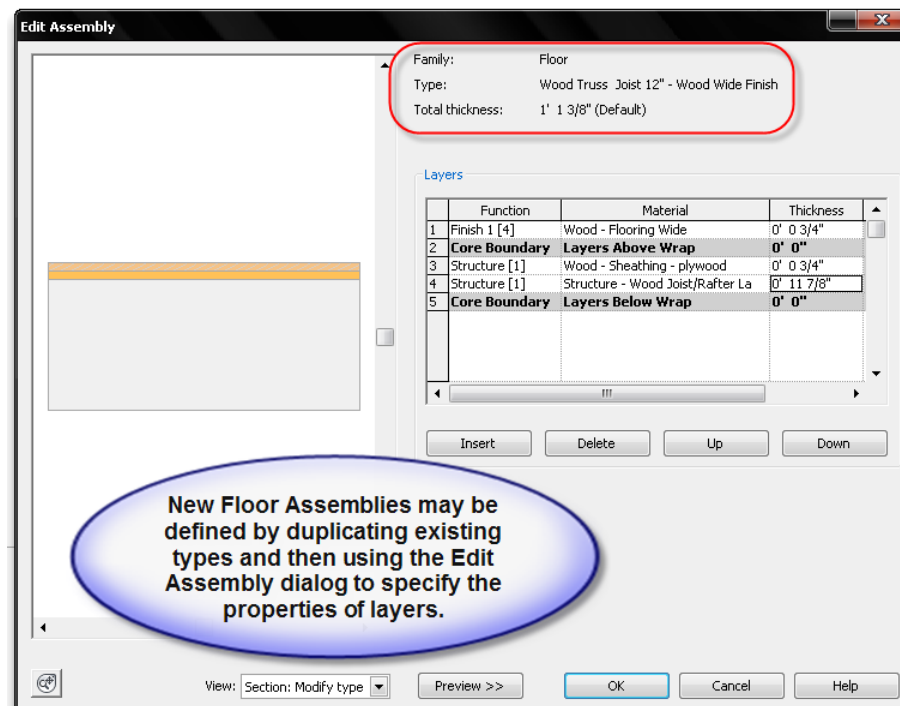


When you define the boundary for a floor, if you choose to extend the floor to the Core face, you will be able to select the core boundary on the exterior side and have your floor cut through the wall and attach at the outer face of the structural wall. When a floor is attached to a wall, it will update and resize to follow the wall if the wall is moved.

Floors are typically sketched in plan views but it is also possible to start a floor in a 3D view or elevation. When you start a floor sketch in an elevation view, you will be prompted to select an existing plan view in which the sketch will be created.

Different types of floor construction are available as Types in the Floor Family. There are generic floor types with a single component slab as well as more complex types which include different layers to define the structural and finish components.

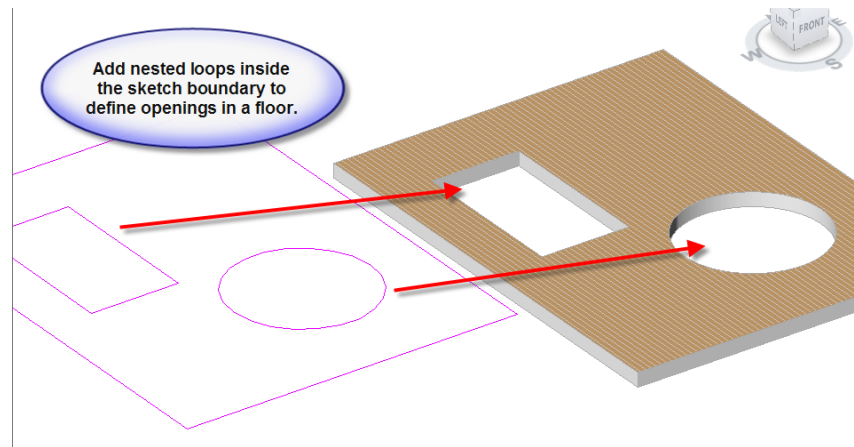
Custom floor types may be created with any number of layers in the same manner that compound walls are defined. Editing a Floor Assembly displays fewer options than walls with no tools for splitting, merging, or applying sweeps and reveals.



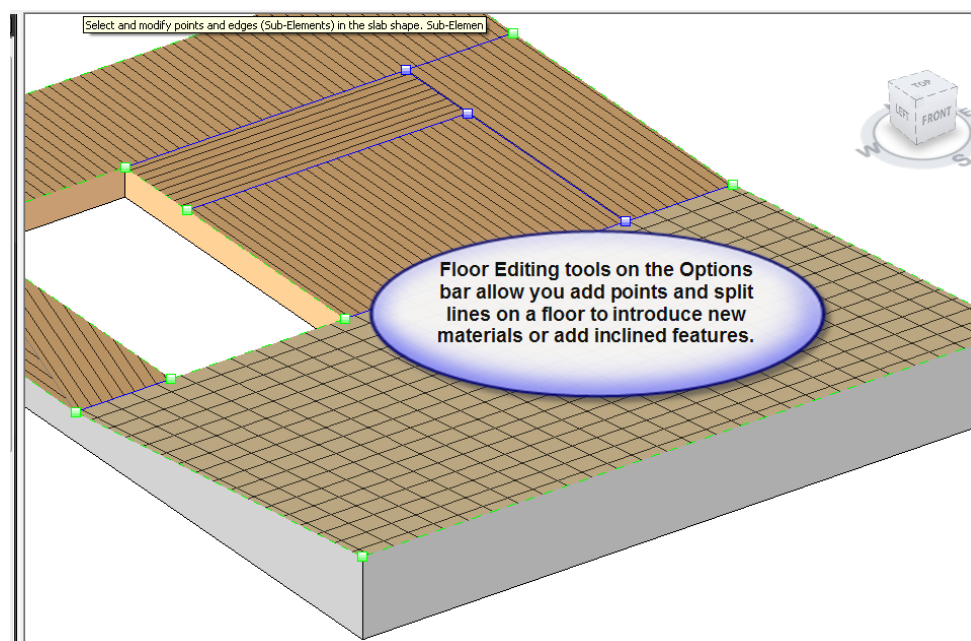
Sloped Floors may be created by adding a slope arrow to the floor sketch. Slope arrows let you specify a height at the tail of the arrow and another height at the head of the arrow. The floor will maintain constant thickness but will be rotated so the floor surface passes through the elevations defined by the slope arrow properties.

A second method for creating a sloped floor is to select one of the perimeter lines in the floor sketch and access its element properties. Select the Defines Constant Height parameter and you can then specify an explicit offset height from the base elevation for that edge, or you set it to Define Slope which will open up the Slope Parameter.

When you sketch floor boundaries, any nested loops inside the overall perimeter will define a hole or opening through the floor assembly.



Floors may be edited directly, outside of the sketch environment, by using the Shape Editing tools on the Ribbon which appear when a floor is selected.



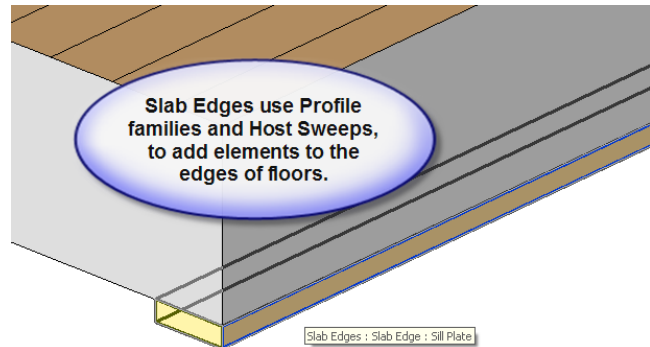
Floor Edit tools allow you to add Modify the elevations of selected points or edges on the floor. You can also add new points and draw split lines along the floor surface. Split lines define new faces or regions within the floor on which you can paint new materials.

2. Floor Slab Edges

Slab edges may be added to horizontal edges of selected floors through the use of Hosted Sweeps. The shape of the slab edge is defined with a profile family, similar to the way we define wall sweeps or roof sweeps.

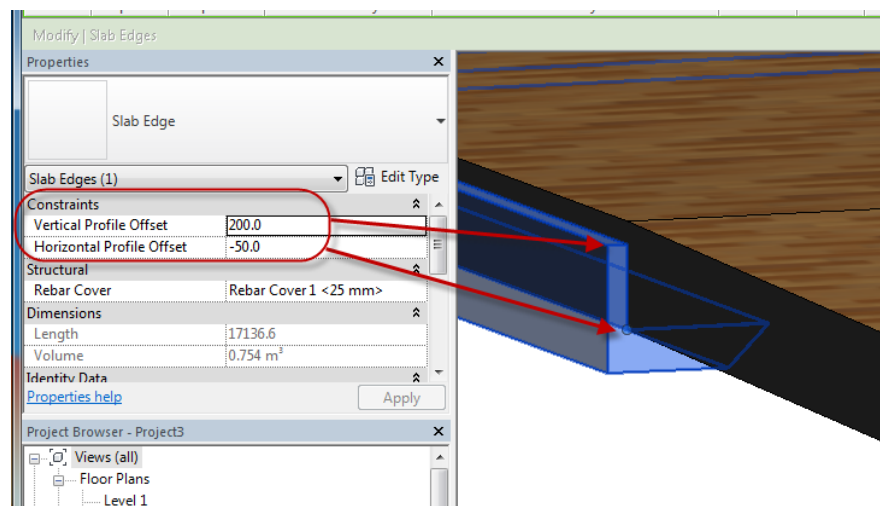
Slab edges cannot be added in the Edit Assembly dialog as we can with Wall sweeps but must be added after the floor has been created.

The default Slab Edge profile is used to represent the thickened edge of a concrete slab floor, but by defining your own profile in the Family Editor, it is possible to create swept elements with any closed shape.



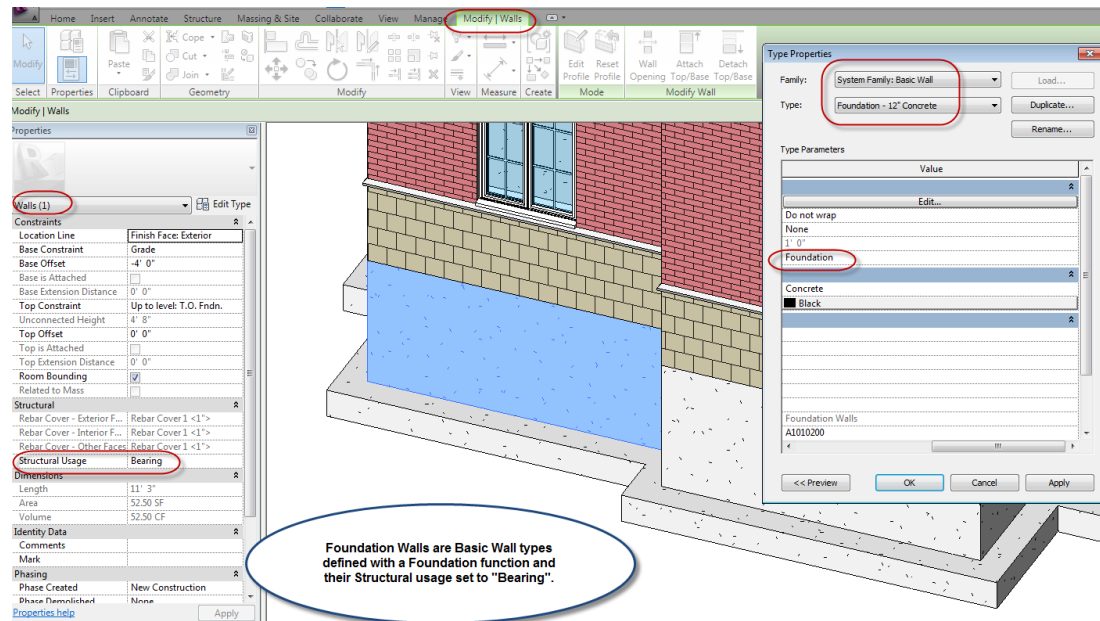
When you define a Hosted Profile, you set the insertion point of the profile relative to the position of the Host, so you should be able to preset the position of the sweep so it is added in the appropriate position when you select the Host sweep edges on the floor. If the profile insertion point is on the wrong side of the profile, the sweep may be added inside the floor or even upside down. Selecting a slab edge will display flip arrows that allow you to mirror the sweep around the horizontal or vertical axes. These options are also available from the cursor menu.

If you need to edit the position of the slab edge relative to the host edge, vertical and horizontal offsets parameters in the element properties dialog are available.



3. Foundation Walls

Revit allows you to draw Foundation walls and footings with the Structural Wall tool on the Structure tab of the Ribbon or with the regular wall tool.



Foundation walls are walls that are defined with a basic wall type with the wall Function construction parameter set to Foundation. The Structural usage for foundation walls will be set to bearing.

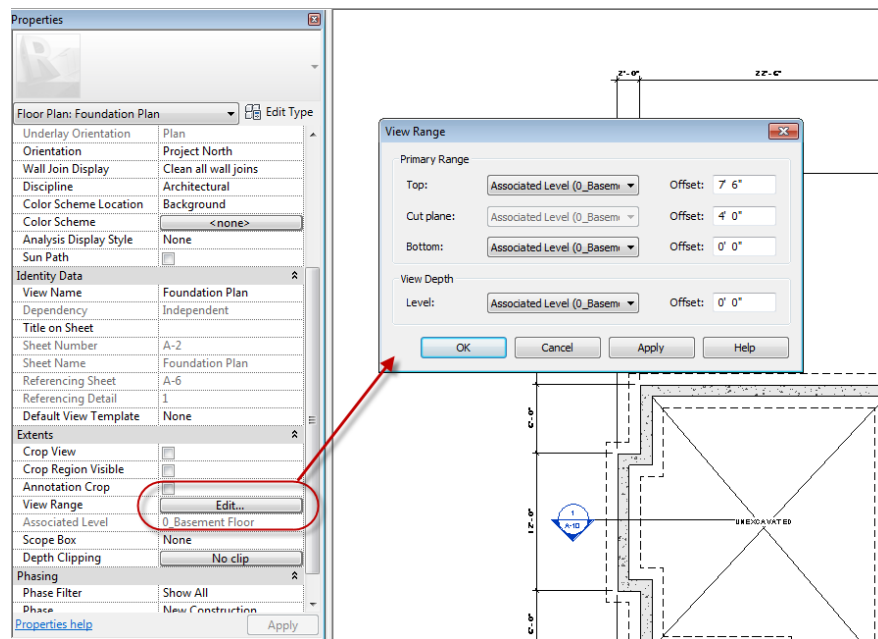
When you add a foundation wall type, the vertical extents of the wall are defined with a depth parameter on the options bar instead of the typical height. When you examine a foundation wall's element properties however, the familiar Base constraint, Top Constraint, offsets and extensions are all available. Setting the top constraint to Unconnected also displays the Unconnected Height label instead of the term "depth".

Foundation walls may be drawn by picking points as you would draw normal walls, or if you have already drawn the exterior walls of the building, you can use the Pick Lines tool to trace the walls above.

Foundation walls can be drawn in a basement plan view with the base constraint set to top of footing and the top constraint set to top of foundation, if these levels have been defined. You need to work in a level above the base constraint level for this method to work correctly.

When you draw Foundation walls, in a project started with the Residential template, you can draw the walls in the Foundation view and you will be able to see the walls as you draw them. If you use the Default template or a custom template in which you define your own level for a Foundation, you may need to adjust the View range for that level so you can see the walls as you create them.

The View Range setting is a set of parameters available for Plan view types which defines the vertical extents of the view. The View range is a set of four horizontal planes that control the display of objects in a view.



The Primary range lets you set the top and bottom clip plane for a view by selecting a level and specifying an offset from that level as well as the height of the cutting plane. The view depth is an additional setting that allows you to set a depth for the display of elements below the primary range. By default the view depth is coincident with the bottom plane.

To specify a working view range for drawing a foundation wall from the Top of the Foundation level, set a negative distance for the offsets and view depths equal to or greater than the depth of the foundation.

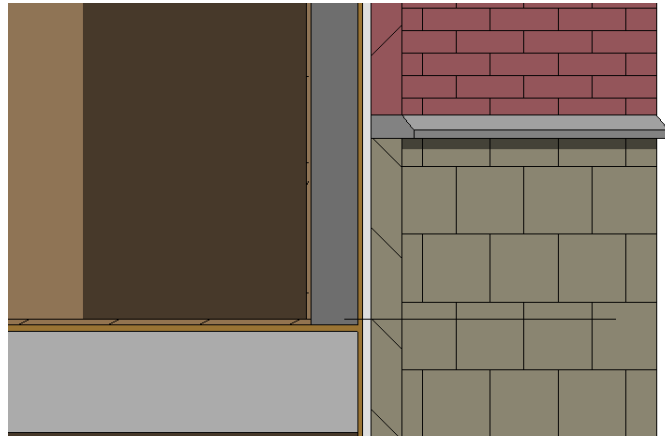
Adjusting the View Range is critical to properly displaying a Plan View showing multiple levels, such as first floor and second floor, in a single view.

Exercise Notes

In the following exercise we will define custom floor assemblies and add floors to the Manor House project. With the floors in place we will then add the foundation walls and footings to define the preliminary structural support system for the building

1. Open the Manor House project and set the First Floor View active. At this point all interior and exterior walls should be in place and all roofs should have been added. Sweeps should be in place for stone sills on the exterior walls, built up fascias should be applied to all roof eaves, and gutters should be applied where appropriate. Wall profiles have been edited where required and overlapping elements have been joined to clean up connections.
2. Set the detail level to Coarse. From the Build panel on the Ribbon, choose Floor. On the Options bar, set the Offset to 0'-0" and choose the Extend into Wall (core) option.
3. Choose Edit Type from the Properties palette and in the Type Selector, choose Wood Truss Joist 12" – Carpet Finish and pick Duplicate. Name the new type Wood Truss Joist 12" – Wood Wide Finish. Choose Edit in the Structure parameters to open the Edit assembly dialog. Modify the Layer 1 Finish material and set it to Wood-Flooring Wide with a thickness of $\frac{3}{4}$ ". Pick ok twice to close the dialog.
4. Zoom on one of the exterior wall corners of the main house. Choose Pick Walls and move your cursor into the middle of one of the walls until it highlights and a dashed line appears indicating the border of the floor drawing along the outer core boundary. Press the TAB key and then pick to do a chain selection of the walls. Zoom back out and continue with the sketch by picking any remaining exterior walls. Trim or delete any extra edges until you have a closed boundary all the way around the main building footprint. Pick Finish Sketch. When prompted to Join the floor to the exterior walls, choose. Yes.
5. Zoom to Fit. Type SD to Shade the view. Turn on the Shadow display. Nice. 😊
6. Select the Section 1 section line and resize its extents, dragging it all the way through the building and out through the bay on the right side. Add a third section line cutting through the front door and out through a window in the back wall.

7. Double click the section head for the longitudinal section, to switch to section 1 view. Zoom in on a corner of the new floor at a wall connection. Set the detail level to medium or high. Type SD. Turn on shadow display. Try toggling the Thin lines off and on to see how it affects the visible edges. Check the distance from the underside of the floor to the top of the foundation and then adjust the T.O Fndn level height to -1'-3".

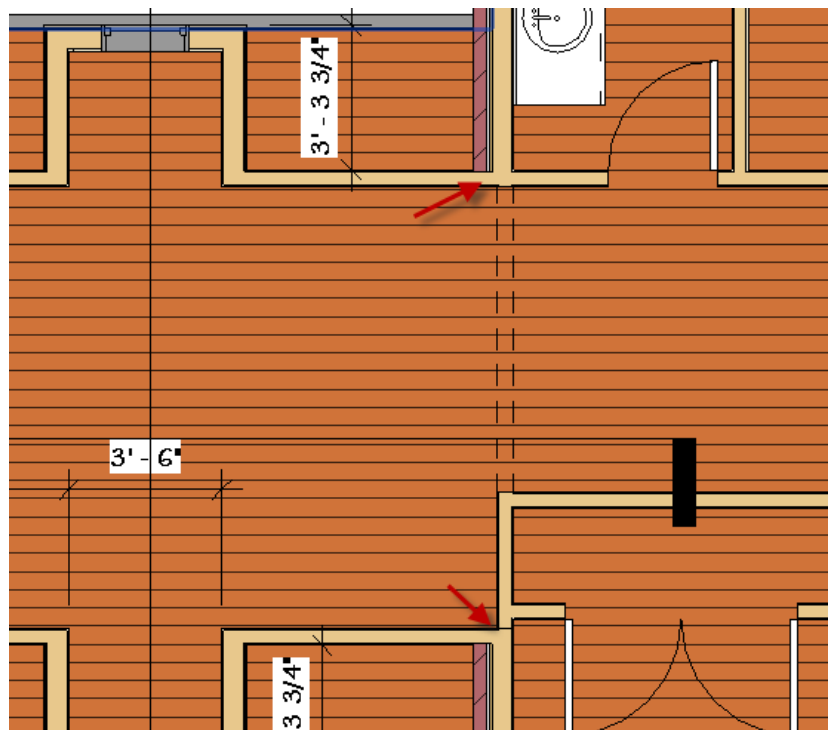


8. Select all main exterior house walls and increase base extension to -1'-3". Adjust exterior walls at porte cochere and garage as required to align sill sweeps so they align below the window sills.

9. Switch to the Second Floor view. Turn off any underlays you have visible. Pick the roof if it is visible around the edge of the guest suite, right-click and choose Hide In View / Category.

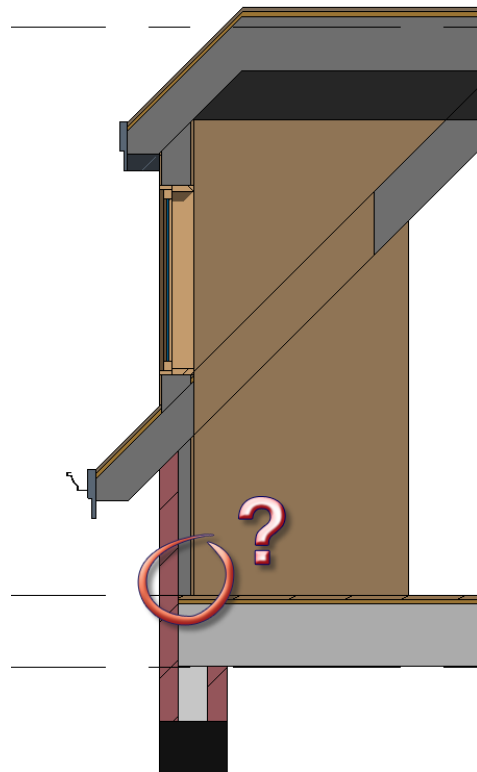
10. Zoom in to the main wall that still divides the guest suite and den from the rest of the house. Split the wall in two steps to divide it into 3 segments.

11. Select the middle segment and change its top constraint to Top of Plate 1.



12. Set the detail level to coarse. Add a new partition wall where the previous wall has now been lowered to the first floor ceiling and is no longer visible. Add an 84" elliptical arch opening in the new wall to provide access from the main building. (create new 84" wide type)

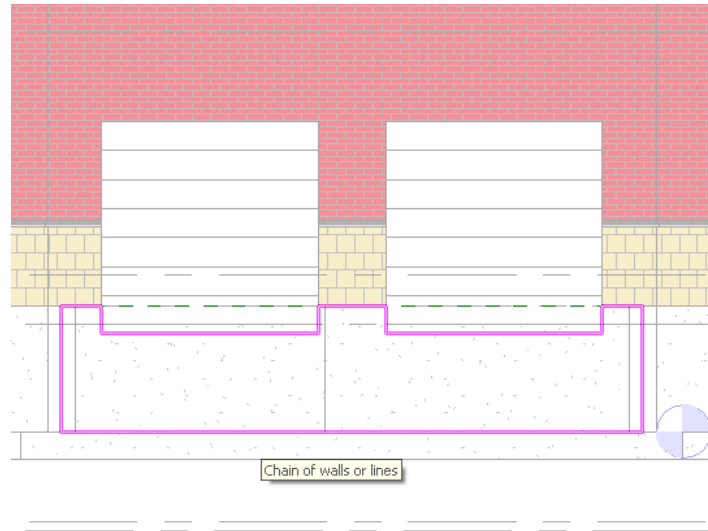
13. Create a new Floor over the entire second floor of the building. You could do this floor in separate sections and if the floor structure varied this would be advisable. We will use the same floor type throughout, so we'll make a single perimeter loop in one step. Use the same method as for the first floor, extending the floor boundary to the wall core.
14. When you finish the sketch, you'll receive an option to "have the walls that go up to this floor's level attach to its bottom and the exterior walls around the garage are being highlighted. We are already attaching these walls to the Roof or have edited their profiles at the top, so PICK NO!! Next, you'll see the option to join the floors to the exterior walls and you do want to pick Yes for this option.
15. Shade the display of the second floor. Enable shadows and note their relative lengths on the inside and outside of the building where they are hitting at different elevations. In the Properties palette, choose the Edit button by View Range. Move the dialog so you can still see the floor plan. Change the Cut Plane elevation from 4'-0" to 1'-0". Pick Apply. Check it at 6' and then put it back to the default 4'-0". Close the View properties dialog.
16. If you have not yet renamed your section views, do so now. Section 1 will become the Longitudinal Section. Section 2 will become Dormer Section, and Section 3 will be called Cross Section. Double click the Section head for the Dormer Section and zoom in to see how the floor wall connection at the dormer is shaping up.
17. If you traced the walls for the second floor along the perimeter of the walls below some adjustments may be in order. The front wall of the dormer needs to be aligned with the face of the core component in the porte cochere walls below. Use the Align tool to shift the dormer wall so the outer face of the plywood sheathing is in line with the outer face of the floor system.



19. If you examine the section closely and if you notice that the finish floor is extending under the exterior wall, this is not correct. Pick the Join Geometry tool, pick the floor, and then dormer wall to clean the connection.
20. Switch to the Basement Floor view. Set the Underlay to display the First Floor view above.
21. From the Structure Tab on the Ribbon pick Wall and in the type Selector choose Foundation- 12" Concrete. In the element properties set the Base constraint to T.O. Ftg. and the top constraint to T.O. Fndn. On the Options Bar set the location line to Finish Face Exterior. Trace the perimeter of the main building's exterior walls cutting straight at the living room bay window. (This section of floor and walls will be cantilevered and does not require a foundation).
22. When the foundation perimeter is completed, switch to a3D view. From the Structural tab, choose Foundation / Wall and in the type selector, choose Wall Foundation: Bearing Footing – 36" x 12". Move your mouse over one of the foundation walls and press TAB to chain select all of the walls. Pick to add footings to the foundation in a single step. ☺
23. Switch to the North view and zoom in around the garage. Create a new level called T.O. Ftg. 2 and set it to 4'-0" below the grade line.
24. Switch back to the Basement Floor. view and add foundation walls and footings below the garage and porte cochere. The wall's base constraint will be at the new level you just created.
25. Switch to a 3D view and add footings to the new foundation walls using the same method as for the main house walls in step 21. The location and position of the footings are derived automatically from the foundation walls and the footings always go in at the correct height.

26. Use the Edit Profile method to add a notch in the top of the foundation walls at both arch openings through the Porte Cochere as well as at the garage doors in the back wall of the garage. Set the depth of the notch to 11" below the top of the wall.

27. Switch to Basement Floor level and zoom in on the garage. We could add this slab in the Grade level as well, but the basement floor level will make it easier to align the



floor slab with the Foundation walls. Start the floor tool and create a new floor type by duplicating an existing floor type. Create a single layer with Concrete in place material and a thickness of 4".

Under Constraints set the level to Grade. Use the Pick Walls option and clear the "extend into wall" option before doing a Tab select to pick the chain of garage walls. Finish the sketch. Switch to the Basement view and add a second floor slab inside the main building and with the constraint set to Basement floor level.

28. Select one of the footings and type SA to select all instances. Apply an element override to all of the footings to show their Projection edges with a Hidden linetype and to turn off their surface pattern.

29. Switch to each of the main section views and examine the connections between the interior partitions on the first floor and the floor above. Use the Join geometry tool to clean up the connection between the walls and floors where they meet.

30. Save and backup your project. We'll start cutting holes in our beautiful floors in the next class when we work on adding the stairs. 😊

